Operation and Installation Manual

SCW Series
Central Chilling Stations

Important! Read Carefully Before Attempting to Install or Operate Equipment

Part No. A0551795 **Bulletin No. SC3-635.1**

Write down your unit serial number(s) _____

here for future reference _____

_____

_____

Sterling is committed
to a continuing program of product improvement.
Specifications, appearance, and dimensions described in this manual
are subject to change without notice.

Effective 4/11/2008
Part No. A0551795 Bulletin No. SC3-635.1

Safety Considerations

Sterling SCW Series central chilling stations are designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes.

To avoid possible personnel injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- ☑ Only **PROPERLY TRAINED** personnel familiar with the information within this manual should work on this equipment.
- ☑ Follow all local **SAFETY CODES**.
- ☑ Wear **SAFETY GLASSES** and **WORK GLOVES**.
- ☑ Disconnect and/or lock out power before servicing or maintaining the chiller.
- ☑ Use care when **LOADING**, **UNLOADING**, **RIGGING**, or **MOVING** this equipment.
- ☑ Operate this equipment within design specifications.
- ☑ **OPEN**, **TAG**, and **LOCK ALL DISCONNECTS** before working on equipment. Sterling recommends following OSHA Lock-Out/Tag-Out Standard 29 CFR 1910.147.
- ☑ Make sure the unit is properly **GROUNDED** before switching power on.
- ☑ When welding or brazing in or around this equipment, be sure **VENTILATION** is **ADEQUATE**. **PROTECT** adjacent materials from flame or sparks by shielding with sheet metal. An approved **FIRE EXTINGUISHER** should be close at hand and ready for use if needed.
- ☑ Do not jump or bypass any electrical safety control.
- ☑ Do not restore power until all tools, test equipment, chiller and related equipment have been removed.

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Charts and Figures

1 General Information

1-1 Introduction

Sterling SCW Series central water chilling stations are available in water-cooled and remote air-cooled designs. They differ only in the condensing media used. The SCW Series units are configured with two independent circuits using multiple compressors for each circuit. This manual lists information for these units.

SCW Series chilling stations may be configured with stainless steel pump tanks for use as reservoirs for chilled water processes. These dual-well models hold hot and cold water before and after it is pumped through the chiller. Tanks have recirculation pump(s) to send return water to the chiller and process pump(s) to pump cooled water directly to process. Standby pumps may be utilized to distribute pump service or to allow uninterrupted chiller operation during pump maintenance.

Properly installed, operated, and maintained SCW Series chilling stations provide many years of reliable operation. **To get the most satisfaction from your new chiller, read and follow the instructions in this manual.**

1-2 Necessary Documents

The following documents are necessary for the operation, installation, and maintenance of Sterling SCW Series central chillers. Additional copies are available from Sterling.

Familiarize the appropriate personnel with these documents:

- ☑ This manual.
- ☑ The schematic and connection diagram in the control enclosure.
- ☑ Operation and installation manuals for accessories and options selected by the customer.
- ☑ The Customer Parts List included in the information packet.

1-3 Models Covered

This manual provides operation, installation, and maintenance instructions for the SCW Series central chilling stations.

Model numbers are listed on the serial tag. A model number followed by **Q** indicates a specially constructed unit, and not all information in this manual may apply. Make sure that you know the model number, serial number, and operating voltage of your chiller if you contact Sterling.

1-4 Standard Features

- Two independent refrigeration circuits
- High-efficiency screw compressors
- Stainless steel brazed plate (60 & 75) Shell & Tube (90 – 195) evaporators
- Cleanable shell and tube condensers (water-cooled models)
- Electronic expansion valve
- 2 remote single circuit condensers with variable speed lead fans and fan cycling (air-cooled models)
- NEMA 12 electrical enclosure
- Mitsubishi FX2N PLC control with F930GOT touchscreen interface.
- High and low refrigerant pressure safeties
- Touch-safe branch circuit fusing
- Evaporator water piping manifold (Condenser manifold optional)
- R-134a refrigerant
- Digital low temperature freezestat
- Liquid line solenoid and shut-off valves
- Chilled water flow switches
- 1 year warranty on parts and labor
- 3 year warranty on controller

1-5 Available Options

SCW Series central chillers are available with options to tailor the unit to your requirements. Some are factory installed; some can be retro-fitted in the field. Consult Sterling sales for more information. Available SCW Series options include:

- Advanced control package including: Mitsubishi P2A PLC control with A970GOT – color touchscreen interface; provides control of up to nine additional chillers, cooling tower system, water treatment system
- General Fault audible/visual alarm with elevated light stack
- Non-fused rotary thru-the-door disconnect switches
- Electrical operation available in 208, 460, and 575 volts, 60 Hz; 200, 380, and 415 volts, 50 Hz
- UL/$_C$UL-listed electrical subpanel
- Water cooled condenser manifold
- Onsite startup

Standard Features on Remote Condensers

- Direct-drive 3-phase fan motors with ball bearings and internal overload protection
- Electronic variable-speed control of lead fan and fan cycling for constant condenser head pressure control
- Fans are 30” (76 cm) in diameter and have PVC-coated steel fan guards; 1½ hp (1.12 kW) variable-speed fans are 26” (66 cm) in diameter
- Internal baffles between fan cells
- UL listed in the United States and Canada
- Patented floating tube coil to eliminate tube sheet leaks
- Copper tube condenser coils have corrugated aluminum fins
- Weather-proof control panel with factory-mounted door interrupt switch
- High-efficiency condenser coil, designed for optimum performance
- Aluminum housing provides corrosion protection for outdoor applications

Model Number Nomeclature

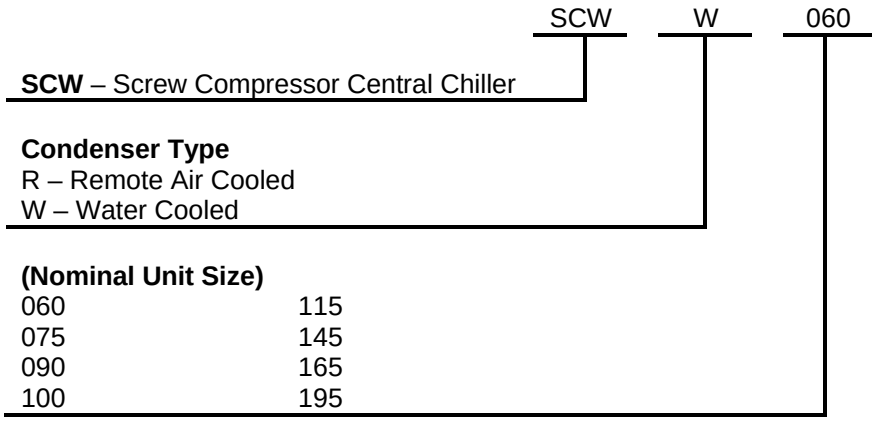
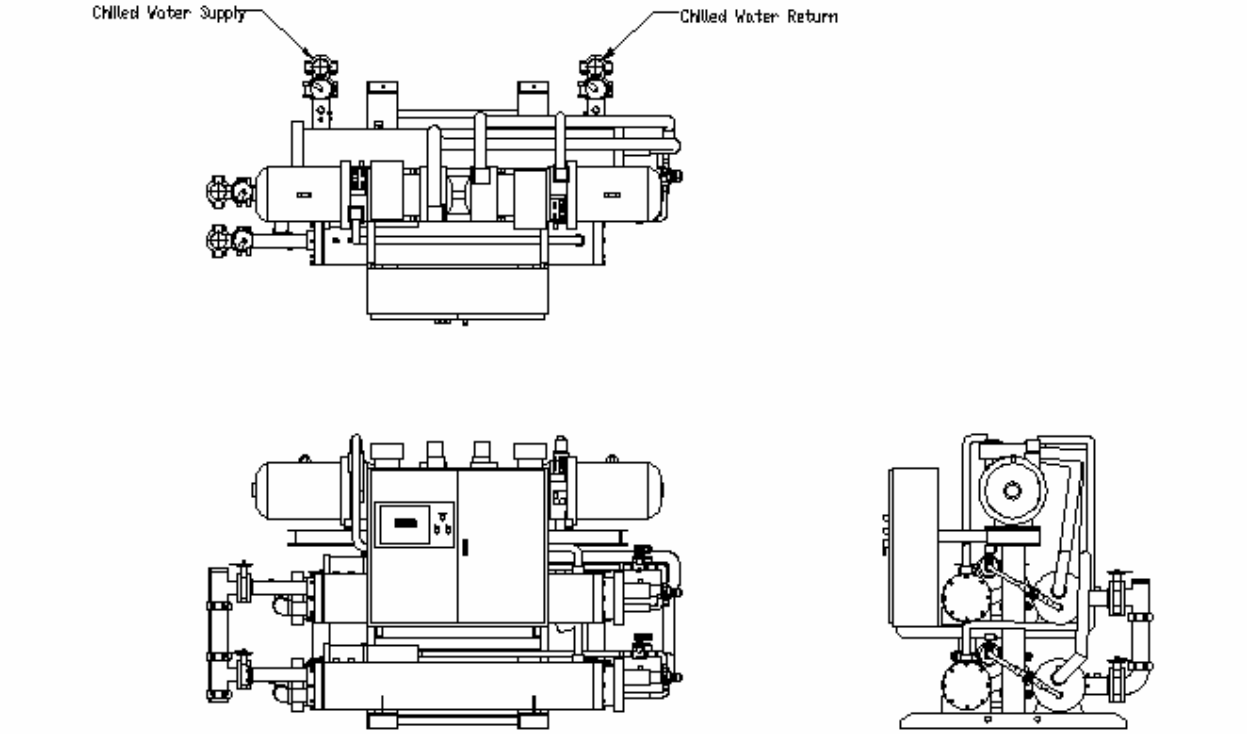


Figure 1
Typical Two-Circuit 60-195 Ton Water Cooled Chiller



Model		SCWW-xxx			
		60	**75**	**90**	**100**
Cooling Capacity (tons) @ 50°F LWT①		60.4	74.9	88.8	102.2
Capacity stages		Infinite Unloading			
EER (BTUH/W)		15.2	15.1	15.7	15.5
Nominal water flow (gpm)	Evaporator②	145	180	213	245
	Condensers③	181	225	266	307
Condenser connection (no manifold) Flange Conn. (in.)		2.5		3	
Evaporator manifold connection Victaulic		3		4	
Amp draw, nameplate (460/3/60 V)④	Water-cooled	112	130	138	170
Dimensions (in.)	Height	85		74	
	Width	100		115	
	Depth	45		72	
Shipping weight (lbs)		3,266	3,512	4,336	4,982
Max operating weight (lbs.)		3,468	3,754	4,594	5,246

① Based on 50ºF (10ºC) chilled water supply temperature and 85ºF (29ºC) tower water.
② Based on 2.4 gpm per ton (9.1 lpm per 3.517 kW).
③ Based on availability of 85ºF (*29ºC*) tower water at 25 psi (*172.4 kPa/1.7 bars*) minimum.
④ Multiply 460/3/60 amperage by 2.0 for 208-230/3/60 amperages; multiply by 1.2 for 380/3/60 amperages; multiply by 0.8 for 575/3/60 amperages

Model		SCWW-xxx			
		115	**145**	**165**	**195**
Cooling Capacity (tons) @ 50°F LWT①		116.3	146.0	166.3	193.1
Capacity stages		Infinite Unloading			
EER (BTUH/W)		15.5	16.2	15.9	16.2
Nominal water flow (gpm)	Evaporator②	279	350	399	463
	Condensers③	349	438	499	579
Condenser connection (no manifold) Flange Conn. (in.)		3	4		
Evaporator manifold connection Victaulic		4	6		
Amp draw, nameplate (460/3/60 V)④	Water-cooled	216	250	282	316
Dimensions (in.)	Height	77	81		
	Width	124	137		
	Depth	72	75		
Shipping weight (lbs)		5,298	8,844	9,376	9,580
Max operating weight (lbs.)		5,584	9,428	10,102	10,364

① Based on 50ºF (10ºC) chilled water supply temperature and 85ºF (29ºC) tower water.
② Based on 2.4 gpm per ton (9.1 lpm per 3.517 kW).
③ Based on availability of 85ºF (*29ºC*) tower water at 25 psi (*172.4 kPa/1.7 bars*) minimum.
④ Multiply 460/3/60 amperage by 2.0 for 208-230/3/60 amperages; multiply by 1.2 for 380/3/60 amperages; multiply by 0.8 for 575/3/60 amperages

Figure 2
Typical Two-Circuit 60-195 Ton Remote Air Cooled Chiller

Model		**SCWR-xxx**			
		60	**75**	**90**	**100**
Cooling Capacity (tons) @ 50°F LWT		53.8	67.1	79.1	91.2
Capacity stages		Infinite Unloading			
EER (BTUH/W)		9.4	9.9	9.8	10
Nominal water flow (gpm)	Evaporator	129	161	190	219
Evaporator manifold connection Victaulic		3		4	
No. of condenser fans per condenser		3	3	4	4
Amp draw, nameplate (460/3/60 V)	Chiller	112	130	138	170
	Condensers (per condenser)	11	11	14	14
Dimensions (in.) of chiller	Height	75		74	
	Width	100		115	
	Depth	45		72	
Dimensions (in.) of each condenser	Height	50			
	Width	45.5		45.5	
	Depth	180		235	
Shipping weight (lbs)	Chiller	2,574	2,676	3,456	3,532
	Condensers (each condenser)	1,190	1,210	1,580	1,620
Max operating weight (lbs.)	Chiller	2,600	2,710	3,498	3,580
	Condensers	1,215	1,240	1,650	1,660

Model		**SCWR-xxx**			
		115	**145**	**165**	**195**
Cooling Capacity (tons) @ 50°F LWT		104.1	130.5	148.4	174.0
Capacity stages		Infinite Unloading			
EER (BTUH/W)		10.3	10.5	10.4	10.2
Nominal water flow (gpm)	Evaporator	250	313	356	418
Evaporator manifold connection Victaulic		4	6		
No. of condenser fans per condenser		4	5	6	8
Amp draw, nameplate (460/3/60 V)	Chiller	216	250	282	316
	Condensers (per condenser)	14	18	21	28
Dimensions (in.) of chiller	Height	77	81		
	Width	124	137		
	Depth	72	75		
Dimensions (in.) of each condenser	Height	50			
	Width	45.5			88
	Depth	235	290	345	235
Shipping weight (lbs)	Chiller	4,156	7,528	7,554	7,698
	Condensers (each condenser)	1,760	2,380	2,480	3,230
Max operating weight (lbs.)	Chiller	4,212	7,788	7,814	8,016
	Condensers (each condenser)	1,800	2,435	2,540	3,300

① Based on 50ºF (10ºC) chilled water supply temperature and 95ºF (35ºC) ambient air.
② Based on 2.4 gpm per ton (9.1 lpm per 3.517 kW)
③ Multiply 460/3/60 amperage by 2.0 for 208-230/3/60 amperages; multiply by 1.2 for 380/3/60 amperages; multiply by 0.8 for 575/3/60 amperages

SCWR Series Remote Condenser Models

Model Number	Fan(s) Each					Refrigeration ② Connections		Charge
	Dia. in.	Motor hp ①	Amps 460V	Fans	Air flow cfm ③	Discharge ODS(in.)	Liquid ODS(in.)	R-134a lbs. ③
SCWR60	30	1 ½ hp 3 ø	11.0	3	34,800	2 1/8	2 1/8	19
SCWR75	30	1 ½ hp 3 ø	11.0	3	32,900	2 1/8	2 1/8	19
SCWR90	30	1 ½ hp 3 ø	14.0	4	46,400	2 1/8	2 1/8	22
SCWR100	30	1 ½ hp 3 ø	14.0	4	42,400	2 1/8	2 1/8	27
SCWR115	30	1 ½ hp 3 ø	14.0	4	41,500	2 1/8	2 1/8	27
SCWR145	30	1 ½ hp 3 ø	18.0	5	51,800	2 5/8	2 5/8	43
SCWR165	30	1 ½ hp 3 ø	21.0	6	65,800	2 5/8	2 5/8	50
SCWR195	30	1 ½ hp 3 ø	21.0	8	87,800	2 @ 2 1/8	2 @ 2 1/8	44

① ø represents electrical phase; all motors are 1,140 rpm. Multiply hp by **0.746** to convert to *kW*.

② Refrigeration charge is for **remote condenser only!**

③ To convert cfm to *cmh*, multiply by **1.699**. To convert lbs. to *Kg*, multiply by **0.454.**

2 Shipping Information

2-1 Unpacking and Inspection

You should inspect your equipment for possible shipping damage. Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

2-2 In the Event of Shipping Damages

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage

Hold the damaged goods and packing material for the examining agent's inspection. **Do not return any goods before the transportation company's inspection and authorization.**

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

2-3 If the Shipment is Not Complete

Check the packing list as back-ordered items are noted on the packing list. In addition to the equipment itself, you should have:

☑ ..... Bill of lading

☑ ..... Packing list

☑ ..... Operating and Installation packet

☑ ..... Electrical schematic and panel layout drawings

☑ ..... Component instruction manuals (if applicable)

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

2-4 If the Shipment is Not Correct

If the shipment is not what you ordered, **contact the parts and service department immediately** at (262) 641-8610. Have the order number and item number available. *Hold the items until you receive shipping instructions*.

2-5 Returns

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

2-6 Uncrating Your New Chiller

! WARNING !

DUE TO THE SIZE AND WEIGHT OF SCW SERIES CHILLERS, STERLING RECOMMENDS USING BONDED PROFESSIONAL MILLWRIGHTS TO UNLOAD AND MOVE SCW SERIES CHILLERS.

Rig the chiller from the frame only, using spreader bars to prevent load transfer to any chiller components. Rig the frame from at least four points and balance the load before lifting to clear the skid. Use a forklift of adequate size when lifting the chiller by the fork pockets.

Insert the forks all the way into the pockets and be sure to balance the load before lifting the chiller to clear the skid. Lift only as high as necessary. Use a pry bar to free the skid if necessary. Lower slowly. Retain the crating in case reshipment is necessary due to hidden shipping damage.

Caution!

Due to the weight of these units, use extreme caution when moving and placing SCW Series chillers.

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- Notes -

3 Installation

3-1 Installation Location Considerations

As with all equipment installations, follow all applicable codes and regulations.

- ☑ Locate close to the process to reduce piping expense.
- ☑ Locate adjacent to drain and city water sources.
- ☑ Consult a structural engineer to assure that the floor, mounting pad or structural steel support is of adequate strength.
- ☑ Allow for required service clearances necessary for condenser maintenance and easy access to all components.

3-2 Making Electrical Connections

SCW Series systems are designed for three-phase voltage operation. Refer to the unit nameplate for proper voltage and amperage requirements.

Make sure you provide a correctly sized and protected supply of electrical power to the unit.

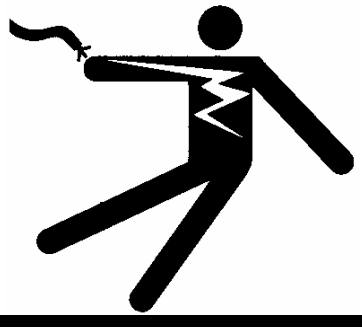
Important!

Refer to National Electric Code (NEC) Article 430-24 through 430-26 for proper feeder conductor and supply disconnect sizing.

Maintain a safe ground and disconnect the power supply before servicing the unit. A qualified electrician should make electrical connections, and disconnect and lock out electricity using OSHA 29 CFR 1910.147 standards when you need a service call.

Check serial tag voltage and amperage requirements and make sure your electrical service conforms *before* making any electrical connections. Total running amps for the SCW Series systems are listed on the nameplate. Customer connections can be run to the supply terminals from either side of the unit. Make sure that all three phases are wired correctly. If not wired properly, the unit will run *backwards*. **Again, check the unit nameplate for correct voltage and amperage.**

! DANGER



Improper electrical connections will damage the unit and cause serious operator injury or death! Compressor damage will occur if compressors are run backwards.

Bring properly sized power leads and ground from a fused disconnect (installed by your electrician) to the unit. Provide external overcurrent protection to the unit, using circuit breakers or fuses. If you use fuses, make sure that they are dual-element time-delay fuses, sized according to your electrical code. Make sure that **all** electrical connections are ***tight***.

Important!

1. **Electrical connections must comply with all applicable electrical codes.**
2. **The chiller must be grounded in accordance with NEC Article 250.**
3. **Voltage must be within plus or minus ten percent (±10%) of the nameplate rating.**
4. **Make sure your installer provides external protection.**

Check Compressor Rotation Before Starting Unit!

1. **Connect a phase monitor and phase incoming power ABC.**
2. **Connect a refrigerant gauge to the suction service valve. Fully front seat the service valve and open one full turn.**
3. **Bump start the compressor by switching off then on quickly 0.5 to 1 second. If the rotation is correct, the suction pressure will drop immediately. A rise in pressure will indicate the wrong rotation. If this occurs, change over two electrical phases of the incoming power supply (do not change phase at the compressor starter).**

Check the electrical wiring schematic provided in your Customer Information packet for additional information.

Note:

- Never switch contactor leads or motor leads for reversing rotation.
- Do **not** use contactor or motor leads for phase matching.
- Compressor damage will occur if the compressor is run in reverse. The compressor motor protector checks for correct phasing and will not allow it to start in reverse.
- If you discover that compressor rotation is reversed, correct it by switching any two **main** power leads **into the disconnect switch or distribution block** on the unit.

Check your work and proceed to the following **Piping Considerations** section.

3-3 Piping Considerations

Piping systems vary with process application and pump tank configuration. Typical system configuration drawings are provided in this manual; the details may or may not apply to your application. Piping systems must be designed by a person knowledgeable in piping system design and configuration. Sterling's Contracting Department can design and install a piping system tailored to your process.

- All water piping returning to the pump tank **must** be equipped with an inverted trap with a vacuum breaker at the high point of the system to prevent mains from siphoning into the pump tank.
- Run mains full size in order to reduce pressure drop in the system and provide maximum pressures at the ends of the mains.

3-4 Making Process Water Connections

All Models

All SCW Series chilling stations have two chilled water connections per unit, and on water-cooled models, one more set of water connections for condenser water:

To Process

The chilled water supply outlet leading to the process being controlled.

From Process

The chilled water return for water returning back to the chiller from the process to be cooled and recirculated. Adjust the butterfly valve for the pressure drop that corresponds to the model number of the chiller. Pressure drop is equal to supply pressure minus return pressure

Model Number	Water Side Pressure Drop			
	Condenser (each)		Evaporator (each)	
	Flow (gpm)	PD (psi)	Flow (gpm)	PD (psi)
SCWW/R60	91	4.0	72	5.3
SCWW/R75	102	4.7	90	4.5
SCWW/R90	117	4.4	107	5.6
SCWW/R100	150	5.5	123	3.9
SCWWR115	166	4.3	140	3.0
SCWW/R145	196	4.1	175	4.8
SCWW/R165	219	4.1	200	4.6
SCWW/R195	278	4.7	232	6.0

3-5 Making Tank Piping Connections

If you have purchased the SCW Series central chilling station with the integral pump tank, please proceed with this section.

Return

Bring the chilled water returning from the process to the pump tank warm **From Process** side. This line is sized according to the flow rate from the process to the pump tank. See Section 3-3 on Page 21 for more information on piping considerations.

Important!

Do *not* use the SCW Series unit to support piping.

Makeup

Connect a city water source to maintain water level in the pump tank.

Overflow

Connect the **OVERFLOW** outlet to an approved, trapped drain to permit excess water in the pump tank to overflow to the drain. The overflow line is sized according to the size of the pump tank.

To Drain

Connect to a 1½" line (approx. 63 mm) leading to an approved, trapped drain. You can drain the pump tank if necessary.

3-6 Water Connection Sizing Considerations

Important!

- **Run all external chilled water connections with adequate size to the process.**
- **Provide the largest possible openings and passages for the flow of chilled water through platens, dies, molds, or other pieces of equipment.**
- **Minimum external pressure drop is *critical* for proper operation.**

3-7 Galvanic Corrosion Considerations

Water circuit piping components are primarily ferrous (iron) and react electro-chemically with non-ferrous metallic materials such as copper. Some water has dissolved minerals that will greatly accelerate the reaction between dissimilar metals.

Use PVC or ferrous piping to minimize galvanic action. If piping must be copper, use dielectric unions at the chiller.

3-8 Water Treatment Considerations

Water treatment is important in any piping system. In some locations, raw water may be used in the system without problem; in other locations, it will result in large deposits of scale and corrosion.

Sterling offers a complete line of water treatment equipment. Contact your Sterling sales representative for water testing and treatment options.

3-9 Making Water-Cooled Condenser Connections

SCW Series water-cooled chilling stations use city or tower water as a cooling medium. All external condenser supply and discharge piping and connections should be of adequate size. Water regulating valves are not required on the SCW Central Chiller if the tower water does not fall below 65°F (18ºC). Water flow must be adjusted based upon the pressure drop in the following table on the next page.

Two connections are made to each SCW Series unit:

Condenser Water In

The city or tower water supply inlet is located at the side or rear of the chiller.

- Water pressure ≥ 25 psi (≥ 172.4 kPa/≥ 1.72 bars)
- Water temperature ≤ 85°F (≤ 29ºC)

Condenser Water Out

The return outlet, located at the chiller side or rear is connected to a cooling tower inlet, a sewer or other approved discharge receiver.

- A water regulating valve is an **optional** feature in the condenser water out line.
- Adjust the butterfly valve for the pressure drop that corresponds to the model number of the chiller. Pressure drop is equal to supply pressure minus return pressure. (If a water regulating valve has been supplied, adjustment is not required.)

Model Number	Water Side Pressure Drop			
	Condenser (each)		Evaporator (each)	
	Flow (gpm)	PD (psi)	Flow (gpm)	PD (psi)
SCWW/R60	91	4.0	72	5.3
SCWW/R75	102	4.7	90	4.5
SCWW/R90	117	4.4	107	5.6
SCWW/R100	150	5.5	123	3.9
SCWWR115	166	4.3	140	3.0
SCWW/R145	196	4.1	175	4.8
SCWW/R165	219	4.1	200	4.6
SCWW/R195	278	4.7	232	6.0

3-10 Installing the Remote Air-Cooled Condenser

SCW Series models use the surrounding air to cool the remote condenser. All models have variable speed fans and low ambient controls to allow proper operation down to -20°F (-29ºC) outdoor air temperature.

Install the remote air cooled condenser where there is:

- Greater than or equal to -20°F (-29ºC) air temperature.
- Free passage of air for condensing.
- Adequate structural support.
- Protection from strong winds and drifting snow.
- Provisions for removal of heated air from the area.

- No steam, hot air or fume exhausts drawn into the condenser coils.
- Service accessibility.

SCW Series condensing pressure with 95ºF (35ºC) condenser air
R-134a = 171 psi (1,179 kPa/11.79 bars)

Note: Due to the variables involved in remote air-cooled condenser installations, no set or standard piping procedure exists. Each installation must be designed and installed by qualified persons. Follow the instructions supplied with the condenser.

3-11 Checking Motor Direction

Compressor

Check Compressor Rotation Before Starting Unit!

1. **Connect a phase monitor and phase incoming power ABC.**
2. **Connect a refrigerant gauge to the suction service valve. Fully front seat the service valve and open one full turn.**
3. **Bump start the compressor by switching off then on quickly 0.5 to 1 second. If the rotation is correct, the suction pressure will drop immediately. A rise in pressure will indicate the wrong rotation. If this occurs, change over two electrical phases of the incoming power supply (do not change phase at the compressor starter).**

Note:

- Never switch contactor leads or motor leads for reversing rotation.
- Do **not** use contactor or motor leads for phase matching.
- Compressor damage will occur if the compressor is run in reverse. The compressor motor protector checks for correct phasing and will not allow it to start in reverse.
- If you discover that compressor rotation is reversed, correct it by switching any two **main** power leads **into the disconnect switch or distribution block** on the unit.

Water Pump

A positive pressure of 20 to 30 psi (137.9 to 206.8 kPa/1.38 to 2.07 bars) on the **TO PROCESS** line indicates correct pump rotation.

Condenser Fan

On SCW Series remote air-cooled units, air should be drawn through the condenser and discharge up from the condenser.

Changing fan rotation direction

- Disconnect and lock out power at the fused disconnect.
- If all fans are going backwards, reverse any two main power leads.
- If only some of the fans are going backwards, switch any two of their respective motor leads.

-Notes-

4 Sequence Of Operation

4-1 Staging

1. The system uses a PID control algorithm to regulate the chilled water temperature. As the required control effort increases or decreases, the system compressors are infinitely unloaded or turned on/off to keep the temperature at the specified set-point.
2. Compressor anti-recycle time is two (2) minutes.

4-2 Alarms

If a fault occurs, that compressor or circuit is deactivated. The load will automatically shift to any other compressors that are currently ON-LINE, but not running. Lead/Lag rotation will continue to function. Compressors that are faulted will be removed from the rotation order.

4-3 Lead-Lag Compressors

The system automatically rotates the compressor order to generate a Lead/Lag rotation. Any time a compressor is faulted or manually taken OFF-LINE, it will be removed from the Lead/Lag rotation. Once the fault is cleared or manually put ON-LINE, the compressor is returned to the Lead/Lag rotation at the end of the rotation order.

4-4 Lead-Lag Pumps

The system automatically rotates the pump order to generate a Lead/Lag rotation. Any time a pump is faulted or manually taken OFF-LINE, it will be removed from the Lead/Lag rotation. Once the fault is cleared or manually put ON-LINE, the pump is returned to the Lead/Lag rotation at the end of the rotation order.

4-5 Chilled Water Circuit

If your central chilling station is equipped with the optional integral pump tank, make the process cooling water supply connection at the P1 manifold at the left side of the pump tank at the exposed connection. Bring the process cooling water return connection to the **Hot** well of the tank on the right side at the flanged connection.

Warm coolant (water and ethylene glycol mixture) returns from the process to the tank, then gets pumped through the evaporator where it is cooled. The coolant flows to the process and returns to repeat the cycle.

4-6 Refrigeration Circuit

- SCW Series chilling station air- and water-cooled unit refrigeration cycles differ only in the way the compressed gas is condensed to a liquid.
- Liquid refrigerant from the condenser passes through a shut-off valve into a filter/dryer.
- The refrigerant then passes through the sight glass and solenoid valves into the thermal expansion valve which regulates flow; the valve lowers pressure and boiling point. Heat from the fluid causes the refrigerant to boil off into a vapor.
- The refrigerant vapor flows through the suction line back into the compressor.
- The refrigerant gives up heat as it re-condenses to a liquid in the condenser.

4-7 Freezestat Control

The freezestat shuts down the compressor if the chilled water temperature approaches the freezing point. The chilled water pump on the system will continue to run. It is factory-set at 40°F (4ºC) or 10°F (6ºC) below the rated capacity operating temperature of 50°F (10ºC).

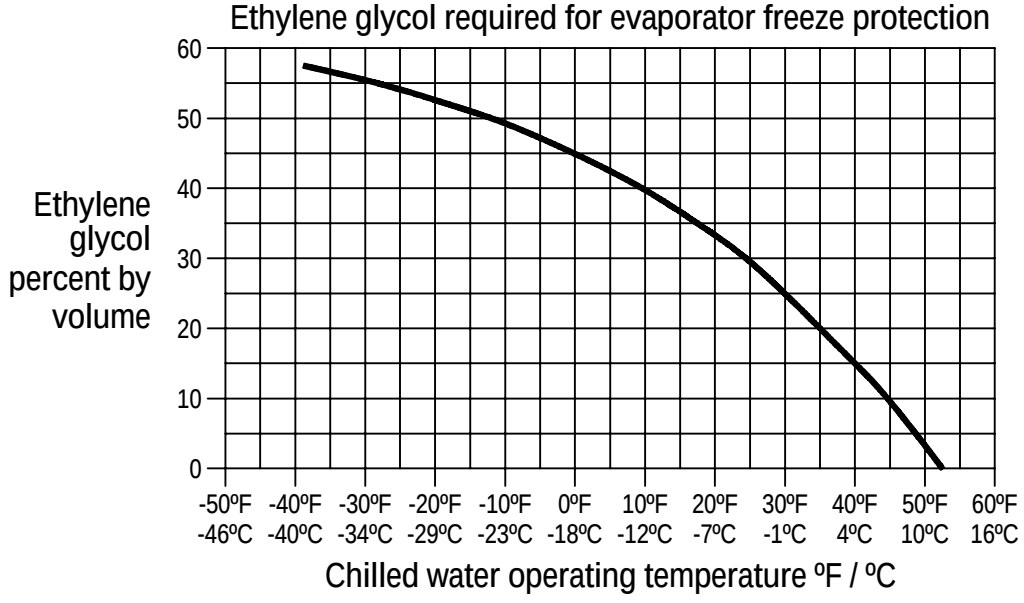
If you want lower chilled water temperatures, you'll need to mix process water with industrial- (not automotive) grade ethylene or propylene glycol with rust inhibitor to provide protection down to 20°F (12ºC) below the operating temperature you want. Figure 3 below shows the proper mixtures needed to provide protection to 20°F (12ºC) below the operating temperature you want. You can then reset the freezestat cutout temperature to a temperature of 10°F (6ºC) below the operating temperature you selected.

Caution!

Make sure all freezestat adjustments are performed by a qualified refrigeration service technician.

The Sterling product warranty does not cover system freeze-up!

Figure 3
Freezing Protection Curve



4-8 High Pressure Cutout

This electro-mechanical safety feature opens the control circuit if the system condensing pressure exceeds a safe level.

High pressure cutout setting			
Model	**psi**	**kPa**	**bars**
SCW Series water-cooled and remote air-cooled chilling stations	290 psi	2,000 kPa	20 bars

Important!

The high pressure cutout is a manual reset control, so you should reset it *once*.

***If the problem persists*, call a refrigeration service technician to analyze the problem and to reset the control.**

4-9 Low Pressure Cutout

This encapsulated switch safety feature prevents the compressor suction pressure from dropping below a pre-set point. It is factory set to open the control circuit when pressure drops below a safe level. The chiller will restart when the suction pressure reaches 30 psi (206.9 kPa/2.1 bars).

Model	Opens control circuit @			Resets control circuit @		
	psi	**kPa**	**bars**	**psi**	**kPa**	**bars**
SCW Series water-cooled and remote air-cooled chilling stations	15 psi	103.4 kPa	1.0 bars	30 psi	206.9 kPa	2.1 bars

4-10 Flow Switch

The flow switch shuts down the chiller if the evaporator water flow falls below a safe operating gallons-per-minute (liters-per-minute) flow rate.

4-11 Control Nozzle

All SCW Series chilling station evaporators have two control nozzles. The flow switch, freezestat, and flush port are located in the control nozzle. Pressure gages are mounted in the control nozzles to aid in achieving proper flow through the evaporator and balancing flows.

Pressure drop between evaporator entering water pressure and evaporator leaving water pressure can be converted to gallons per minute using the pressure drop charts below.

Model Number	Water Side Pressure Drop			
	Condenser (each)		Evaporator (each)	
	Flow (gpm)	PD (psi)	Flow (gpm)	PD (psi)
SCWW/R60	91	4.0	72	5.3
SCWW/R75	102	4.7	90	4.5
SCWW/R90	117	4.4	107	5.6
SCWW/R100	150	5.5	123	3.9
SCWWR115	166	4.3	140	3.0
SCWW/R145	196	4.1	175	4.8
SCWW/R165	219	4.1	200	4.6
SCWW/R195	278	4.7	232	6.0

4-12 Control Probe

Two control probes sense temperatures. One probe measures the temperature of the hot well and the other does the same for the cold well of the reservoir. These temperatures are used by the PLC controller to sequence the compressors, based on load.

4-13 Chilled Water Manifold

The chilled water manifold allows one-point connections of **TO PROCESS** piping. The Sch. 40 steel piping includes butterfly valves at each evaporator for flow balancing and circuit isolation; optional pressure gauges can be installed.

4-14 Optional Condenser Water Manifold

The optional condenser water manifold allows one-point connection of **TO TOWER** (drain) and **FROM TOWER** (city water) piping. Sch. 40 steel include butterfly valves for each condenser.

- Notes -

5 Startup Checklists

5-1 Introduction

Important!

These lists assume the installation information in this manual has been read and followed.

Have new chillers started up and checked by a qualified refrigeration service technician.

Sterling offers factory startup for SCW Series chilling stations. Call the Sterling Service Department at 1 (800) 233-4819 for more details.

5-2 Water-Cooled SCW Series Startup Checklist

- ☑ Check the shipping papers against the serial tag to be sure chiller size, type and voltage is correct for the process.
- ☑ Check the transformer primary voltage connections to be sure they are configured for the electrical power you are using.
- ☑ The voltage at the main power connection must be within plus or minus ten percent (±10%) of the voltage listed on the serial tag.
- ☑ Phase imbalance must be less than two percent (<2%).
- ☑ Electrical connections must conform to all applicable codes.
- ☑ Complete the chilled water **TO PROCESS** and **FROM PROCESS** connections.
- ☑ The optional or field installed chilled water supply and return valves on the chiller must be open.
- ☑ Be sure the pump tank and chilled water circuit are filled with a water/glycol mixture that provides freeze protection to 20°F (12ºC) below the leaving water temperature you want.
- ☑ Complete the tower or city condenser **WATER IN** and **WATER OUT** connections. Provide an adequate condenser water supply; 2 gpm per ton for city water or 3 gpm per ton for tower water operation.
- ☑ Remove all tools, foreign matter and debris from the pump tank reservoir and piping.

- ☑ Complete all piping leading to and from the pump tank. Observe all applicable codes.
- ☑ Complete all electrical wiring. Observe all applicable codes.
- ☑ Prepare all related equipment in the system for operation.
- ☑ Check for proper compressor rotation direction. To confirm proper rotation:
    1. Connect a phase meter and phase incoming power ABC.
    2. Connect a refrigerant gauge to the suction service valve. Fully front seat the service valve and open one full turn.
    3. Bump start the compressor by switching off then on quickly 0.5 to 1 second. If the rotation is correct, the suction pressure will drop immediately. A rise in pressure will indicate the wrong rotation. If this occurs, change over two electrical phases of the incoming power supply (do not change phase at the compressor starter).

Note:

- Never switch contactor leads or motor leads for reversing rotation.
- Do **not** use contactor or motor leads for phase matching.
- Compressor damage will occur if the compressor is run in reverse. The compressor motor protector checks for correct phasing and will not allow it to start in reverse.
    - If you discover that compressor rotation is reversed, correct it by switching any two **main** power leads **into the disconnect switch or distribution block** on the unit.
- ☑ Open the 1” (approx. 25 mm) makeup water valve and allow the tank to fill until the automatic float valve shuts off. The float level should be adjusted so the standing water level is 8” (20 cm) from the top of the tank.
- ☑ Close the discharge butterfly valve, crack it open, then start the pump and observe the gauge.
- ☑ Check for proper pump rotation direction. To confirm proper rotation:
    1. Observe a pump pressure gauge connected to the suction and discharge sides of the pump casing through two ¼” (approx. 6.4 mm) gauge cocks.

2. Close the gauge cock leading to the pump suction and open the gauge cock leading to the pump discharge.
3. Close the discharge butterfly valve, crack it open, then start the pump and observe the gauge.
    - If the gauge indicates within 15 psi (103.4 kPa/1.03 bars) below the pump curve, pump rotation is correct. **Pump rotation is clockwise opposite the shaft end**.
    - If the gauge indicates 20 psi (137.9 kPa/1.38 bars) or more below the pump curve, the pump is running backwards. Reverse rotation by interchanging any two power mains to the pump motor or starter.
    - Recheck the pressure to be sure it increased.

☑ Check the water level in the pump tank to be sure the pump does not run dry while the system piping is being filled.

☑ Check your work and proceed to the Startup procedure.

5-3 Water-Cooled SCW Series Startup

1. Start the chiller by pushing the **Start** button on the control panel of the unit.
2. The screen will display the Main Menu screen.
3. If your chiller has been setup to control the pump tank, the recirculation pump will turn on first, then after 5 seconds the process pump will turn on. If configured with a standby pump, the lead/lag will control which pump turns on.
4. Fifteen (15) seconds after the last pump turns on the first compressor will turn on. Based on the temperature of the water, the controller will turn on compressors every 15 seconds.
5. Adjust the Freezestat cut-out, located in the main electrical enclosure, to 10°F (6ºC) below the process temperature set point you want.

Note: If the recirculation pump does not turn on (or that the flow switch is not satisfied) the compressors will not be allowed to turn on.

6. Check the pump(s) amp draws and pressures. The amp draws must be within the pump(s) running load and service factor amps.

7. Operate the chiller, looking for leaks and listening for unusual noises or vibrations that could indicate improper operation.

5-4 Remote Air-Cooled SCW Series Startup Checklist

- ☑ Check the shipping papers against the serial tag to be sure chiller size, type and voltage is correct for the process.
- ☑ Check the transformer primary voltage connections to be sure they are configured for the electrical power you are using.
- ☑ The voltage at the main power connection must read within plus or minus ten percent (±10%) of the voltage listed on the serial tag.
- ☑ Phase imbalance must be less than two percent (<2%).
- ☑ Electrical connections must conform to all applicable codes.
- ☑ Complete the chilled water **TO PROCESS** and **FROM PROCESS** connections.
- ☑ The optional or field installed chilled water supply and return valves must be open.
- ☑ Be sure the tank and chilled water circuit piping are filled with a water/glycol mixture. The water/glycol mix should provide freeze protection to 20°F below the leaving water temperature you've selected.
- ☑ The air cooled condenser should have an adequate supply of air for proper operation.
- ☑ Connect the main power to the unit and bump-start it to check for proper rotation direction. If the fans are operating backwards, reverse any two main power leads at the incoming terminal block.
- ☑ Remove all tools, foreign matter and debris from the pump tank reservoir and piping.
- ☑ Complete all piping leading to and from the pump tank. Observe all applicable codes.
- ☑ Complete all electrical wiring. Observe all applicable codes.
- ☑ Prepare all related equipment in the system for operation.
- ☑ Check for proper compressor rotation direction. To confirm proper rotation:
    1. Connect a phase meter and phase incoming power ABC.

2. Connect a refrigerant gauge to the suction service valve. Fully front seat the service valve and open one full turn.
3. Bump start the compressor by switching off then on quickly 0.5 to 1 second. If the rotation is correct, the suction pressure will drop immediately. A rise in pressure will indicate the wrong rotation. If this occurs, change over two electrical phases of the incoming power supply (do not change phase at the compressor starter).

Note:

- Never switch contactor leads or motor leads for reversing rotation.
- Do **not** use contactor or motor leads for phase matching.
- Compressor damage will occur if the compressor is run in reverse. The compressor motor protector checks for correct phasing and will not allow it to start in reverse.
- If you discover that compressor rotation is reversed, correct it by switching any two **main** power leads **into the disconnect switch or distribution block** on the unit.

☑ Open the 1" (approx. 25 mm) makeup water valve and allow the tank to fill until the automatic float valve shuts off. The float level should be adjusted so the standing water level is 8" (20 cm) from the top of the tank.

☑ Check for proper pump rotation direction. To confirm proper rotation:

1. Observe a pump pressure gauge connected to the suction and discharge sides of the pump casing through two ¼" (approx. 6.4 mm) gauge cocks.
2. Close the gauge cock leading to the pump suction and open the gauge cock leading to the pump discharge.
3. Close the discharge butterfly valve, crack it open, then start the pump and observe the gauge.
    - If the gauge indicates within 15 psi (103.4 kPa/1.03 bars) below the pump curve, pump rotation is correct. **Pump rotation is clockwise opposite the shaft end**.
    - If the gauge indicates 20 psi (137.9 kPa/1.38 bars) or more below the pump curve, the pump is running backwards. Reverse rotation by interchanging any two power mains to the pump motor or starter.
    - Recheck the pressure to be sure it increased.

☑ Check the water level in the pump tank to be sure the pump does not run dry while the system piping is being filled.

☑ Check your work and proceed to the Startup procedure in the following section.

5-5 Remote Air-Cooled SCW Series Startup

1. Start the chiller by pushing the **Start** button on the control panel of the unit.
2. The touchscreen will display the Main Menu screen.
3. If your chiller has been setup to control the pump tank, the recirculation pump will turn on first, then after 5 seconds the process pump will turn on. If configured with a standby pump, the lead/lag will control which pump turns on.
4. Fifteen (15) seconds after the last pump turns on, the first compressor will turn on. Based on the temperature of the water, the controller will turn on compressors every 15 seconds.
5. Adjust the Freezestat cut-out, located in the main electrical enclosure, to 10°F (6ºC) below the process temperature set point you want.

Note: If the recirculation pump does not turn on (or that the flow switch is not satisfied) the compressors will not be allowed to turn on.

6. Check the pump(s) amp draws and pressures. The amp draws must be within the pump(s) running load and service factor amps.
7. Operate the chiller, looking for leaks and listening for unusual noises or vibrations that could indicate improper operation.
8. Check condenser fans for pressure switch settings as shown in the table below:

Fan number	Set on			Set off		
	psi	kPa	bars	psi	kPa	bars
1	Not applicable; Fan 1 is a variable-speed fan					
2	155	1,069	10.7	120	828	8.3
3	170	1,172	11.7	135	931	9.3
4	185	1,276	12.8	150	1035	10.3
5	200	1,379	13.8	165	1,138	11.4

5-6 Determining Flow Rate

To determine flow:

1. Close the gauge cock leading to the pump suction side and open the gauge cock leading to the pump discharge.
2. Start the pump and make note of the discharge pressure in psi (kPa/bars).
3. Check the pump curve for the appropriate horsepower pump at the discharge pressure psi.
4. Project this point down to find the flow in gpm (lpm).
5. Process pumps can be left wide open if running amps are below full load amps.

5-7 Shutdown

1. Ready process and related equipment for shut down.
2. Donot turn off main power until chiller completes the shut-down sequence (approximately 2 minutes).
3. Close the water make up valve.
4. If the system is to be drained, open the 2” drain valve.

Figure 4
SCW Series Standard Control Panel

Figure 5
SCW Series Advanced Control Panel

-Notes-

6 Graphic Panel Devices

6-1 Indicator Lights and Control Switches (MMI)

System On

The green **System On** indicator lights when the main power switch is on and the control circuit is energized.

Start

The **Start** push-button lets you energize the unit.

Stop

The **Stop** push-button lets you de-energize the unit.

Touchscreen Interface

The color touchscreen interface gives you control over the chilling station. It has an easy-to-use control menu that lets you quickly change or adjust chiller settings and also gives you all the operation information you need to control the unit effectively.

See Chapter 7 on Page 43 for more information on the Standard touchscreen interface operation. See Chapter 8 on Page 57 for more information on the Advanced touchscreen interface operation.

-Notes-

7 Using the Standard Operator Interface

7-1 Operator Interface Introduction

The Standard touchscreen interface lets you control your SCW Series central chilling station. You can do such things as:

- Control compressors and optional pumps
- View current statuses of operation, such as pressures, temperatures, and capacities
- Handle alarm conditions

The sections in this chapter list special instructions for the standard operator interface.

Note: The screens shown in this chapter are ***sample*** screens. Actual screen representations may be slightly different in appearance, but are no different in operation.

On all screens in this controller, the **F4** button is reserved for the previous screen function. Some screens, such as the chiller status screen, do not have sufficient space to display a prompt that the F4 performs this function. However, the **F4** button will always move to the previous screen and will eventually return to the Main Menu.

Figure 6
SCW Series Standard Control Panel

7-2 Using the SCW Series Standard Operator Interface

7-3 Getting Started on the SCW Series Standard Operator Interface

7-4 Viewing and Operating Chiller Compressors

Viewing Compressor Status

Operating the chiller compressors

Setting Compressor Lead/Lag Times and Activating Compressor Lead/Lag Operation

Viewing Compressor Run Times

7-5 Viewing and Operating Chiller Pumps

Viewing Chiller Pump Status

Operating Chiller Pumps

Setting Pump Lead/Lag Times and Activating Pump Lead/Lag Operation

Viewing Pump Run Times

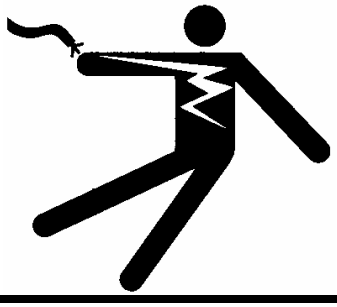
7-6 Viewing Active Alarms and Handling Alarm Conditions

! CAUTION

Never attempt to service a unit until a qualified electrician has opened and locked out the main disconnect using OSHA 1910.147 standards.

All electrical connections must be done by a qualified electrician.

! WARNING



Disconnect all power to the unit, let the unit cool down, and turn off the water *prior to any servicing*.

Failure to do so can result in SERIOUS INJURY OR DEATH!

7-7 Viewing and Setting System Temperatures

Setting System Temperatures

8 Using the Advanced Touchscreen Interface

8-1 Touchscreen Interface Introduction (MMI)

The Advanced touchscreen interfaces let you control your SCW Series central chilling station. You can do such things as:

- Control compressors and optional pumps
- View current statuses of operation, such as pressures, temperatures, and capacities
- Handle alarm conditions

The sections in this chapter list special instructions for operating either touchscreen interfaces.

Note: The screens shown in this chapter are ***sample*** screens. Actual screen representations may be slightly different in appearance, but are no different in operation. Also, the PLC is configured based on options and system configuration at the time of order. These screens are the basic ones to startup the chiller.

Figure 7
SCW Series Advanced Control Panel

8-2 Using the SCW Series Advanced Touchscreen Interface

8-3 Getting Started on the SCW Series Advanced Touchscreen Interface

Figure 8
Main Menu Screen

The Main Menu screen lets you gain access to:

- "**Active Alarms**" contains the current alarm(s) of the system
- "**Al;arm History**" contains the last thirty (30) alarms that were activated.
- "**Compressor Hourmeters**" contains the lifetime and resettable hour meters to show the number of hours that the compressors have been running
- If the chiller was configured to operate the chilled water pump tank, there are three screens to configure and view the pump tank setup. The configuration screen allows for the user to turn on or off any of the pumps as well as configuring the lead/lag rotation (if multiple pumps were configured)
- "**Chiller Configuration**" shows the configuration of the chiller itself including the chiller temperature setpoint, temperature alarm settings, as well as setting up the lead/lag rotation, and the ability to turn on and off the compressors.
- "**PanelView Utilities**" and "**ACS Service**" are both password protected sections of the PLC that are used to configure the display and the initial configuration of the chiller and system.

The following sections in this chapter list the information you need to navigate through these screens for operating and monitoring your SCW Series central chilling station with the Standard Control Package.

8-4 Viewing and Operating Chiller Compressors

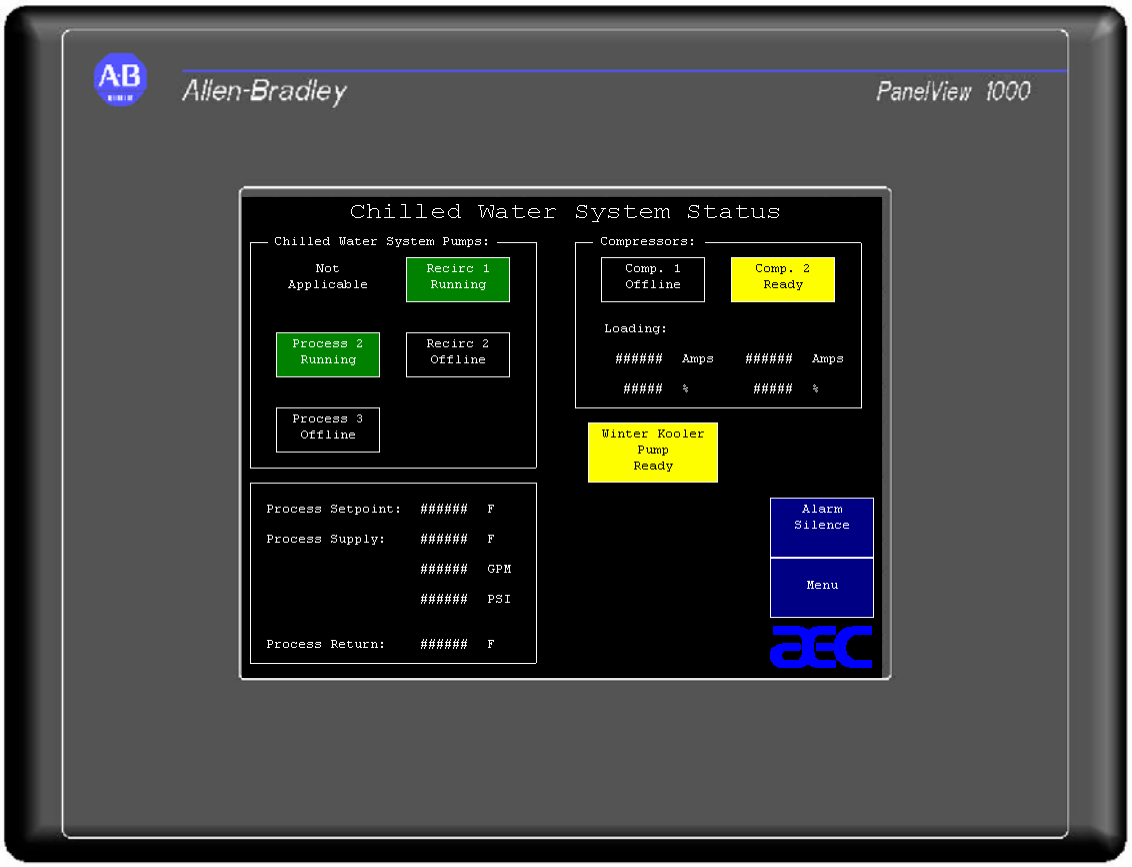
Viewing Compressor Status

To view the status of the chiller compressors, start at the Main Menu screen, then:

- Press the Up or Down buttons on the right side of the screen to highlight "**System Information**"
- Press ↵

The chiller status screen displays:

Figure 9
Chiller Status Screen



The Chiller Status screen shows the status for compressors within the system. Only compressors that are included in the system will

be shown on this screen. Compressors will display one of the following states:

1. OFFLINE – This indicates that the compressor has been turned off in the compressor enable/disable screen. The compressor will not be called to operate until it has been re-enabled. The color code for this indication is black.
2. READY – Indicates that the compressor is enabled and ready to run. However, the current loading does not require the compressor to be running. This compressor will be automatically started when needed. The color code for this indication is yellow.
3. RUNNING – Compressor is currently running. The color code for this indication is green.
4. FAULT – A safety on the compressor indicates a fault condition and the compressor has been deactivated. Once the problem is remedied, the compressor will return to a READY state unless it is put in the OFFLINE state. The color code for this indication is red.

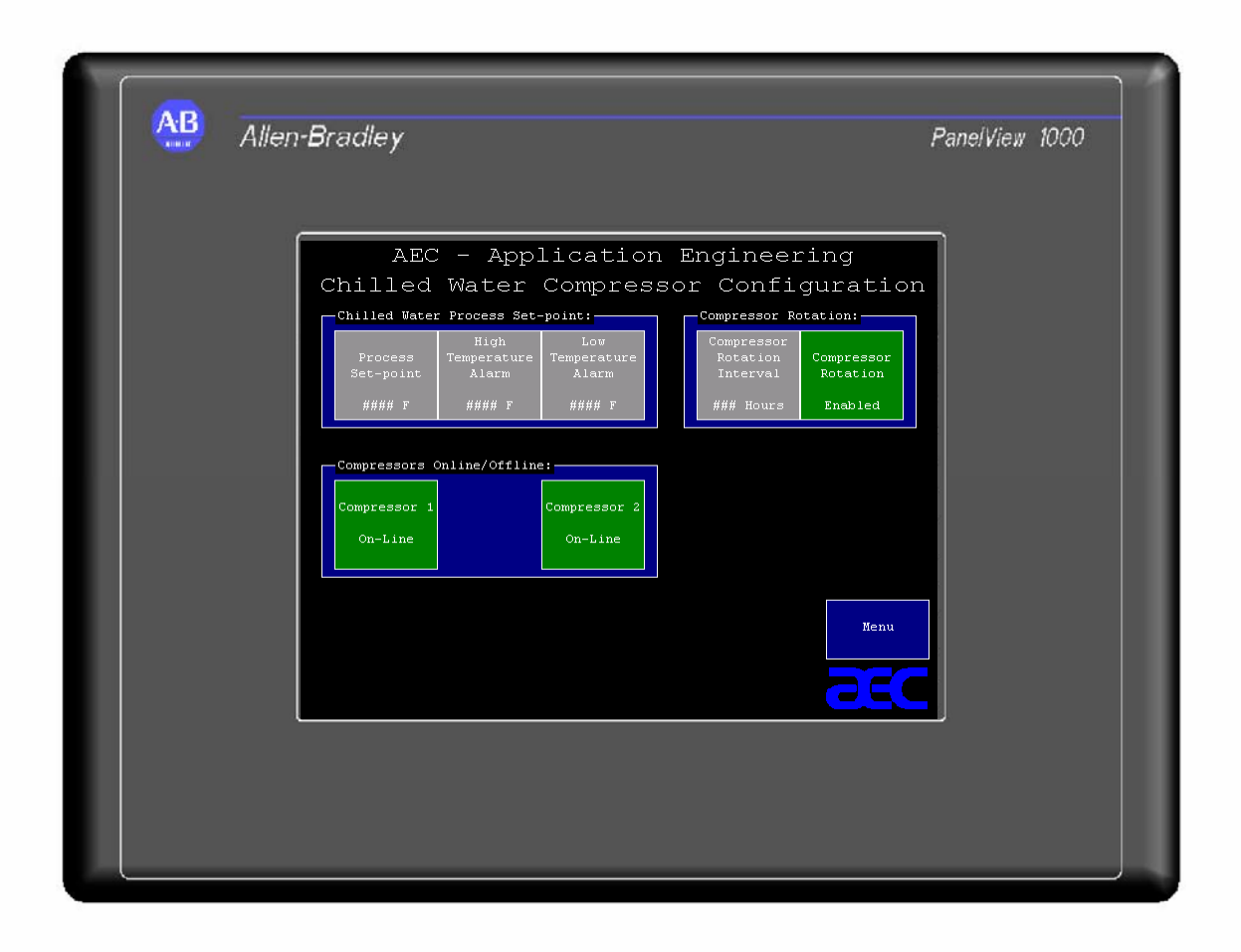
Operating the chiller compressors

To enable or disable the individual compressors, start at the Main Menu, then:

- Press the Up or Down buttons on the right side of the screen to highlight "**Chiller Configuration**"
- Press the ↵ button

The configuration menu screen displays:

Figure 10
Chiller Configuration Screen



- Touch the screen corresponding with the compressor you want to bring On-Line or Off-Line. The background color of the square turns green for On-Line and black for Off-line.

Setting Compressor Lead/Lag Times and Activating Compressor Lead/Lag Operation

While in the Configuration Menu, the compressors can be setup in a lead/lag configuration using interval hours. By pressing the "**Compressor Rotation Interval**" button, a numeric keypad will be displayed and allow the user to change the timeframe of the interval.

To activate the Lead/Lag operation, touch the "**Compressor Rotation**" button. The status of the button will change to Enabled (green background), or Disabled (black background).

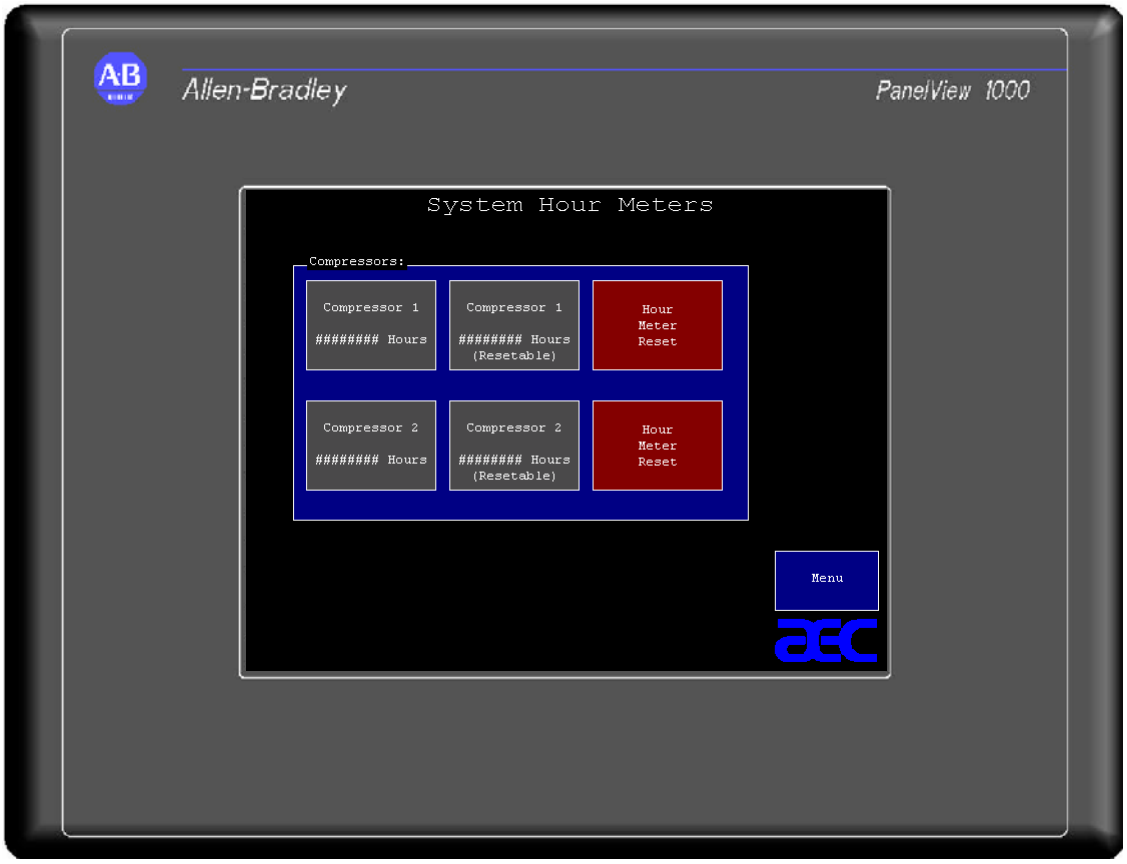
Viewing Compressor Run Times

From the Main Menu, use the Up or Down buttons to highlight the "**Compressor Hourmeters**" menu. Scroll to select the compressors. Then press ↵ to display the hourmeters.

Note: This is a complete list of all compressors that may be included in the system. Any compressor that is not included in the system will not accumulate time.

The Compressor Run Time screen displays:

Figure 11
Compressor Run Time Display Screen



Two hourmeters are kept for each compressor in the system. The first is a lifetime meter. This measures the total time that the compressor has been operational in the lifetime of the chiller. The second is a resettable hourmeter. This hourmeter can be cleared to monitor run time on specific intervals. In order to clear the resettable hourmeter, press the **Hour Meter Reset** button (as prompted on the screen)

8-5 Viewing and Operating Chiller Pumps

If your chiller system was configured to operate the pump(s) of the chilled water pump tank, the user may view the status of the process and recirculation pumps.

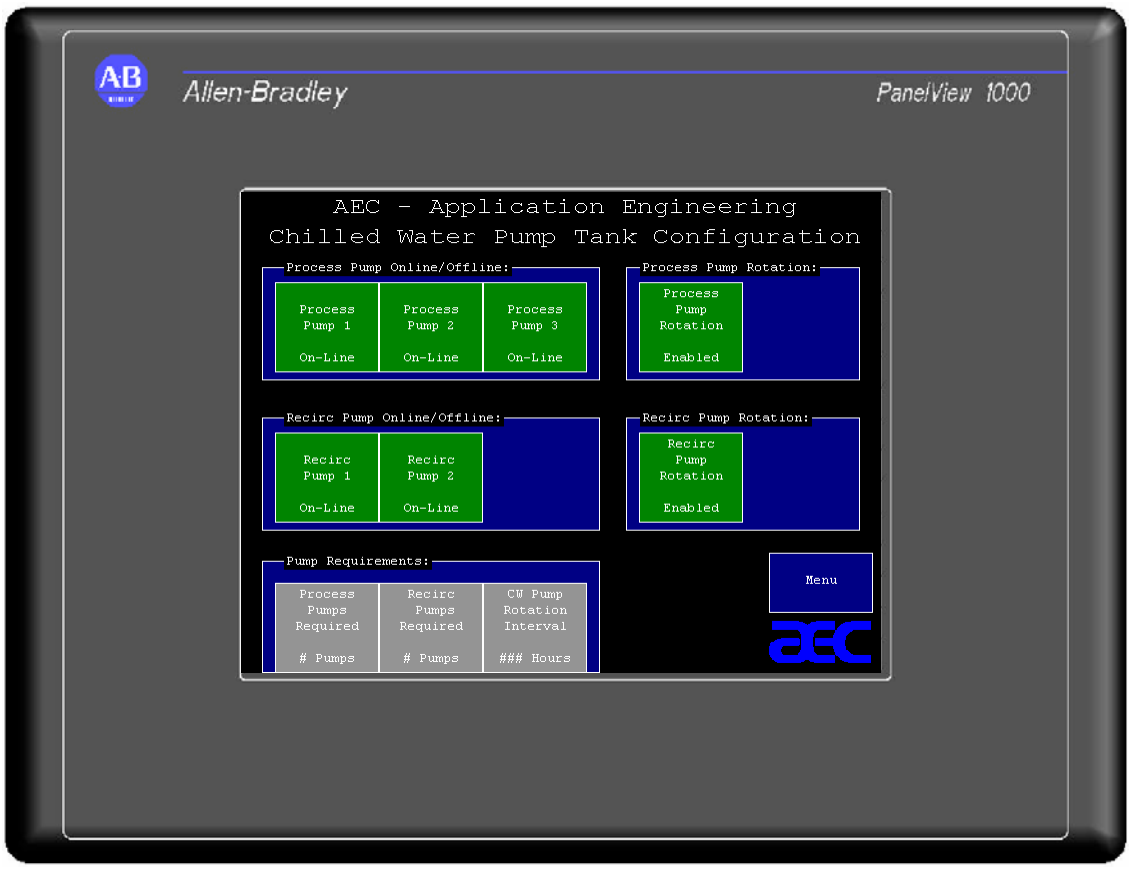
Viewing Chiller Pump Status

To view the status of the pumps, start from the Main Menu, then:

- Press the Up or Down buttons to highlight either "**System Information**".
- Press ↵

The Pump Status Screen appears

Figure 12
Pump Status Screen



Only pumps that are included in the system will be shown on this screen. Pumps will display one of the following states:

1. OFFLINE – This indicates that the pump has been turned off in the pump enable/disable screen. The pump will not be called to operate until it has been re-enabled. The color code for this indication is black.
2. READY – Indicates that the pump is enabled and ready to run. However, the current number of pumps specified to run does not require this pump to operate. The color code for this indication is yellow.

3. RUNNING – Pump is currently running. The color code for this indication is green.
4. FAULT – A safety on the pump indicates a fault condition and the pump has been deactivated. Once the problem is remedied, the pump will return to a READY state unless it is put in the OFFLINE state. The color code for this indication is red.

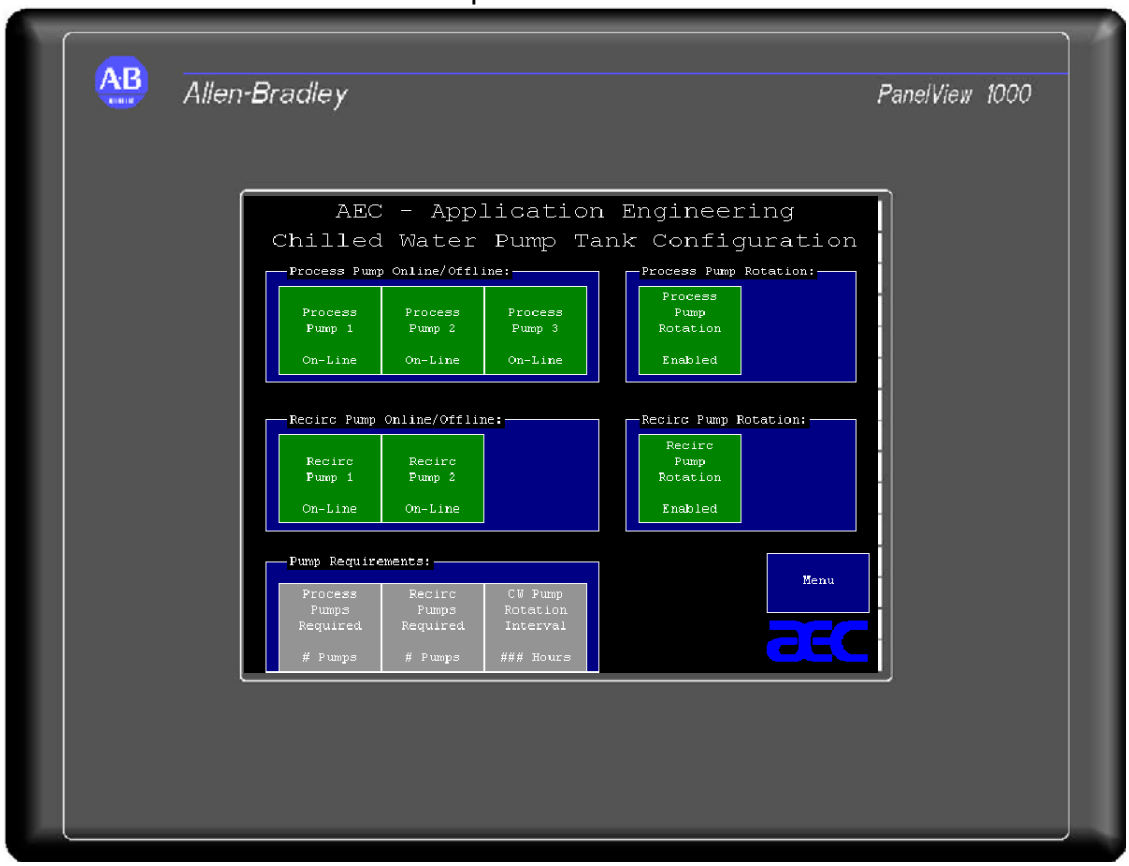
Operating Chiller Pumps

To turn on and off the pumps, start from the Main Menu, then:

- Press the Up or Down buttons to highlight either "**Chilled Water Pump Tank Configuration**".
- Press ↵

The Pump Enables Screen appears

Figure 13
Pump Enables Screen



Any pump that is disabled to the OFF-LINE position will not be called to operate. Simply press the button of the desired pump to

toggle the state of the pump from the ON-LINE to OFF-LINE state.

Setting Pump Lead/Lag Times and Activating Pump Lead/Lag Operation

While in the Configuration Menu, the pump lead/lag (rotation) can be enabled or disabled. Simply press the Process or Recirculation Pump Interval button on the screen to toggle between Enabled and Disabled.

The interval between rotating pumps may also be setup in this screen. Press the CW Pump Rotation Interval button to bring up the time entry screen. Acceptable range is 50-200 hours.

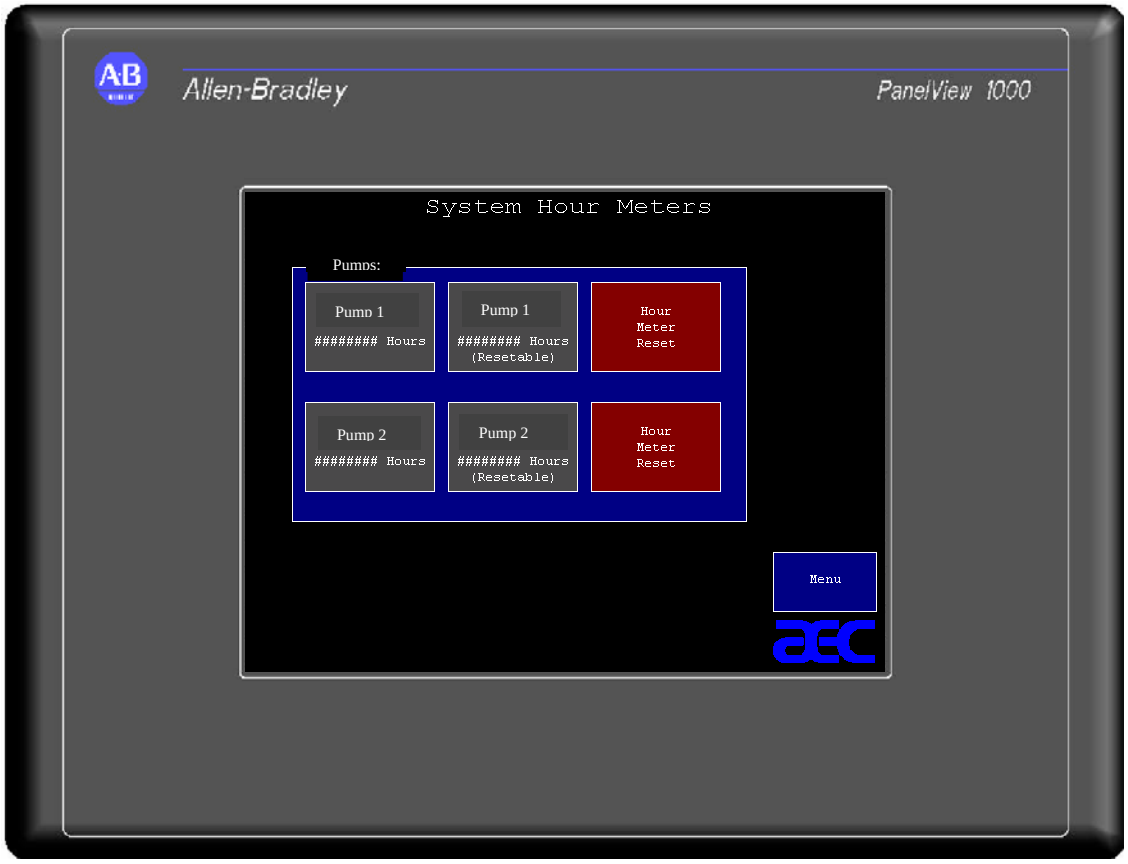
Viewing Pump Run Times

From the Main Menu, use the Up or Down buttons to highlight either the "**Chilled Water Process Pump Hourmeters**" or "**Chilled Water Recirc Pump Hourmeters**" menu. Then press ↵ to display the hourmeters.

Note: This is a complete list of all pumps that may be included in the system. Any pump that is not included in the system will not accumulate time.

The Pump Run Time screen displays:

Figure 14
Pump Run Time Display Screen



Two hourmeters are kept for each pump in the system. The first is a lifetime meter. This measures the total time that the pump has been operational in the lifetime of the chiller. The second is a resettable hourmeter. This hourmeter can be cleared to monitor run time on specific intervals. In order to clear the resettable hourmeter, press the appropriate "**Hour Meter Reset**" button (as prompted on the screen)

8-6 Viewing Active Alarms and Handling Alarm Conditions

These two screens let you view any active alarm conditions as well as the alarm history for the entire history. The list of system alarms that are tracked are as follows:

- Chilled Water High Temperature Alarm
- Chilled Water Low Temperature Alarm
- Compressor Motor Protector Fault (One for each compressor)
- Chilled Water Circuit Low Flow (One per chilled water circuit)
- Chilled Water Circuit Freezestat (One per chilled water circuit)

- Chilled Water Circuit High Pressure (One per chilled water circuit)
- Chilled Water Circuit Low Pressure (One per chilled water circuit)
- Pump motor overload (One per system pump)

If an alarm condition occurs, the follow screen is displayed:

Figure 15
Alarm Condition Screen

To acknowledge the alarm, press the alarm silence button to clear it. It will then appear in the alarm history screen. Except for High and Low Water Temperature, and Low Refrigerant Pressure, these alarms are considered fatal and maintenance must be preformed in order to allow the chiller to fully run. Should a compressor or pump turn off from an alarm condition, the remaining will shut down and display **FAULT** in the status screen for the device.

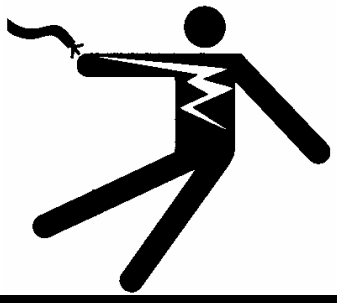
Once a device has gone offline you will need to contact a licensed professional (electrician or refrigeration sevice company) to bring the device back online.

! CAUTION

Never attempt to service a unit until a qualified electrician has opened and locked out the main disconnect using OSHA 1910.147 standards.

All electrical connections must be done by a qualified electrician.

! WARNING



Disconnect all power to the unit, let the unit cool down, and turn off the water *prior to any servicing*.

Failure to do so can result in SERIOUS INJURY OR DEATH!

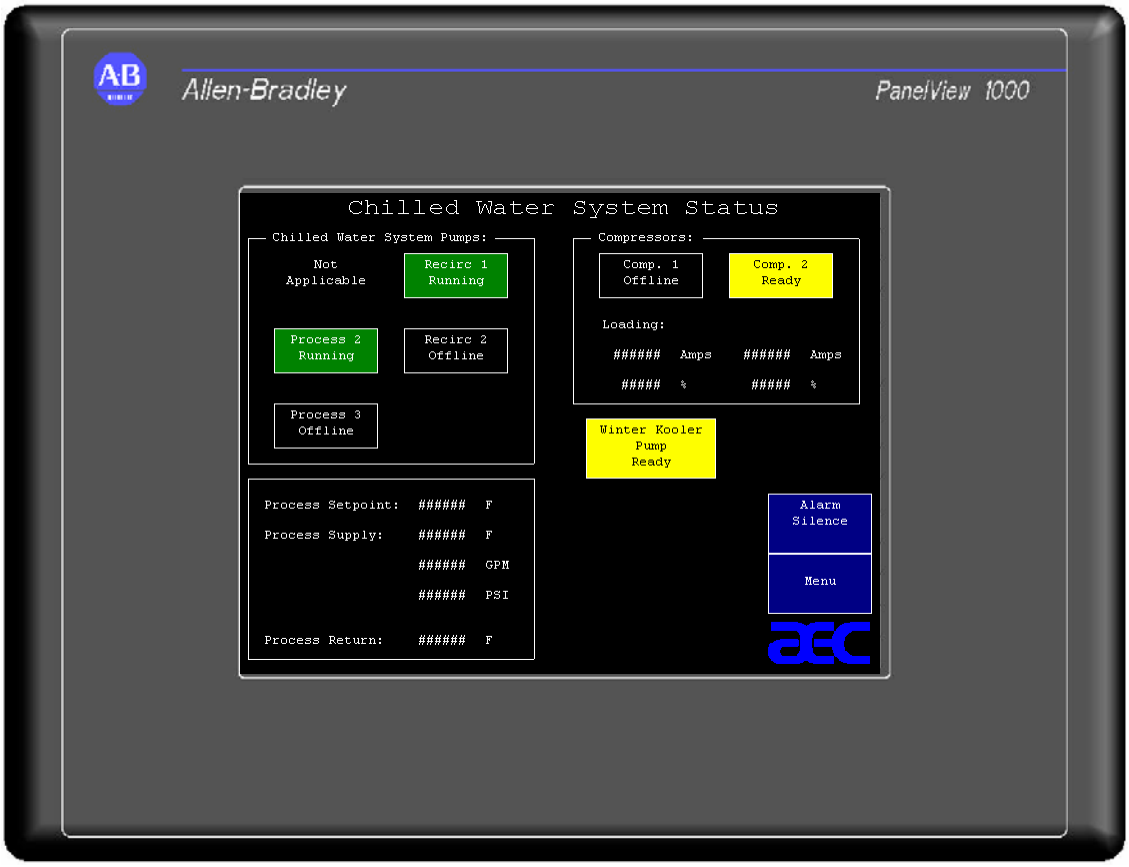
8-7 Viewing and Setting System Temperatures

To view the actual process temperature, start at the Main Menu and

- Use the Up or Down arrows to highlight "**System Information**"
- Press ↵

The system status displays:

Figure 16
System Status Screen



Note: If you have a metric version of the SCW Series controller, the screens display in converted metric values.

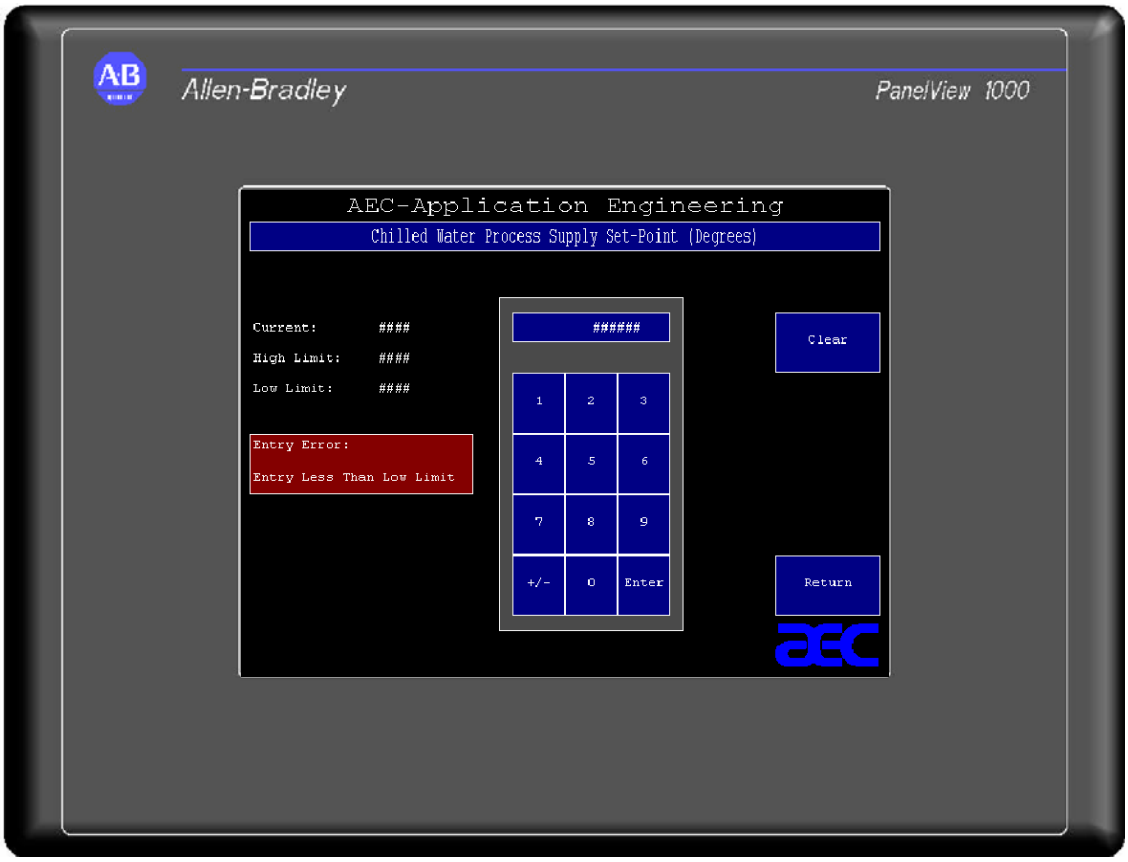
Setting System Temperatures

The chiller setpoints are set through the compressor configuration menu. Starting from the Main Menu:

- Press the Up or Down buttons to highlight "**Chiller Configuration**"
- Press ↵
- Touch the "Process Set-point" button

The input display screen appears:

Figure 17
Temperature Input Display Screen



9 Routine Maintenance

9-1 Lubrication

Grease all fan bearings, fan motors, and pump motors that do not have permanently sealed bearings. Remove the grease relief plug (motors only) before adding grease. **Failure to do so may dislodge the bearing grease retainer which will eventually cause bearing failure**.

Lubricate components regularly, based only on the component manufacturer's specifications for frequency and lubricant.

Compressors require a special scroll oil (Suniso 3GSA or equivalent); **failure to use this oil when lubricating will *void the warranty*.**

9-2 Condenser Maintenance

Dirty condenser heat exchange surfaces reduce system capacity. Inspect and clean as needed.

Remote Air-Cooled

Brush or vacuum light dirt accumulations. Avoid bending or damaging the fins. Heavy soil accumulations on the coil require professional steam cleaning by a qualified refrigeration service technician. Washing from the outside will only make matters worse.

Water-Cooled

Proper water treatment will greatly reduce cleaning intervals.

Remove dirt in the condenser tubes with a nylon tube brush. Mineral deposits can be removed by circulating **Sterling Liquid De-Scaling Solution (Sterling Model Number A0502600)** through the water side of the condenser. Follow the directions on the container.

The refrigerant side is sealed and requires no routine maintenance.

9-3 Evaporator Maintenance

The evaporator(s) may be accessed for back-flushing by removal of the 2” plug (approx. 51 mm) in the return control nipple and the flow switch in the supply control nipple. If the suggested piping recommendations have been followed, one circuit of a multiple circuit chiller may be back-flushed without shutting down the entire system. Check Y-strainer for any clogging.

9-4 Pump Motor Seal

Pump seals require water for lubrication, so the pump(s) must never be run dry. Always fill the tank before attempting to operate the pump(s). Seal failures usually follow a period of dry operation of the pump.

9-5 Makeup Valve

Periodically inspect the water makeup valve assembly for proper operation. If the valve no longer shuts off completely or reliably, replace it. The plastic ball float should be buoyant for proper operation.

9-6 Recommended Pump Tank Spare Parts

Part no.	Part description	Quantity
A0550190	Pressure gauge	1 per pump
A0102396	Float valve, 1” (approx. 25 mm)	1 per tank
A0069538	Plastic ball float, 6” (approx. 152 mm)	
A0102394	Float rod, 10” (25 cm)	
- Call Sterling Parts -	Pump seal and casing gasket	1 per pump

Check your Customer Information Packet for a complete list of spare parts and part numbers for your SCW Series chilling station.

9-7 Preventive Maintenance Service

A systematic preventive maintenance program helps avoid costly down time. Call the Service Department at Sterling to arrange a schedule of inspections. This service, described in **Sterling Bulletin No. 10-106.3**, is tailored to fit your maintenance requirements.

Inspections include:

- ☑ Check refrigerant suction and discharge pressures.
- ☑ Check safety and operating controls.
- ☑ Check voltage and amperage of all motors.
- ☑ Check all electrical connections.
- ☑ Check quantity of refrigerant.
- ☑ Check compressor oil level.
- ☑ Check lubrication of motor and pump bearings.
- ☑ Check circulating pump operation.
- ☑ Check flow through heat exchangers.
- ☑ Check compressor efficiency.
- ☑ Check noise levels.
- ☑ Check cleanliness of equipment area.

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- Notes -

10 Troubleshooting

Problem	Possible Cause	Solution
Unit does not run.	No power.	Check main disconnect, fuses, wiring, and power lead to unit.
	Wrong voltage supplied to unit.	Voltage must be within plus or minus ten percent (±10%) of nameplate rating.
	Defective On/Off switch.	Replace switch.
	Control circuit fuse blown.	Replace fuse, check transformer, check wiring for loose wires, check for shorted coils on contactors and solenoids, check crankcase heater.
	Defective control transformer.	Replace.
	Flow switch circuit is open.	Check pump for proper rotation.
	Pump motor off on overload.	Reset and test motor.
	Unit is off on flow switch or pressure switch.	Check that the chiller pump is running.
		Check that all valves are open.
		Check for defective flow switch or pressure switch.
Pump runs, compressor does not.	Freeze control set higher than temperature of liquid in system.	Lower freeze control setting to 10°F (6ºC) below the leaving temperature you want.
	High pressure refrigerant cutout switch contacts open.	*Air cooled units:* Check and clean air filters. Check condenser fans for proper rotation. Check for dirty condenser. Check for condenser air obstruction. Check for tripped motor overload, blown fuses, or bad condenser fan motor.
		Water cooled units: Check for water valves turned on. Check for dirty condenser. Check water flow through condenser.

Problem	Possible Cause	Solution
Pump runs, compressor does not (cont'd).	Compressor internal overload open.	Allow time to cool and reset. Check for high/low voltage. Voltage must be within plus or minus ten percent (±10%) of nameplate rating.
		Check for poor compressor electrical connections.
		Check compressor rotation on scroll compressors.
	Compressor contactor holding coil open.	Repair or replace.
	Defective fan motor.	Repair or replace.
	Fan motor out on overload.	Reset and test.
	Defective freezestat.	Replace.
	Refrigerant low.	Check the refrigerant charge.
	Defective fan cycling control.	Replace.
	Low refrigerant pressure switch contact open.	Sight glass should be clear while comperssor runs. Call for service if bubbling or foaming.
	Defective pump motor interlock to compressor control circuit.	Repair or replace.
	Broken wire in the compressor control circuit.	Locate and repair.
Pump runs, compressor cycles at short intervals.	Freezestat control setting is too high.	Lower set point to 10°F (6ºC) below the leaving water temperature you want with at least 15 degrees differential.
	Refrigerant is too low.	Check refrigeration charge; check refrigerant sight glass for bubbles or a level in the glass.
Leaving water temperature is not at set point.	Improper water/glycol mixture.	Be sure the antifreeze mixture protection is right for the process.
	Defective freezestat control.	Replace.
	Refrigerant charge is low.	Call service to find and repair the leak. Add refrigerant.
Pump pressure is too high.	Restricted water flow.	Check for partially closed valves etc. Be sure all lines are properly sized.

Problem	Possible Cause	Solution
Pump pressure is too low.	Pump is running in reverse.	Verify proper rotation; if incorrect, see Changing Rotation Direction on Page 25 for more information.
	Check for foreign matter.	Clean the system. You may also have to pull the pump and inspect the impeller. Check for foam in the water circuit; add anti-foam if needed.
Process water pressure low, pressure at pump high.	Evaporator frozen.	Isolate evaporator, thaw out, check for leaks. Check coolant solution. Coolant solution should be good for at least 10ºF (6ºC) below leaving water temperature.
Unit runs continuously, but not enough cooling power.	Restricted condenser air flow.	Clean air filters, clean condenser, check water flow.
	Refrigerant not feeding.	Check superheat on expansion valve.
	Improper water/glycol solution.	Make sure that coolant mixture protection is right for the process.
	Poor heat transfer in evaporator.	Backflush and clean evaporator.
	Unit low on refrigerant.	Call service.
	Low water flow through evaporator.	Increase flow to design flow of 2.4 gpm/ton.
	Inefficient compressor.	Call service.
	Unit under-sized for application.	Call sales representative.

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Service Notes

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Service Notes

Service Notes

Service Notes

Technical Assistance

Parts Department

Call toll-free 7am–5pm CST or call [800] 423-3183, [262] 641-8610, or fax to [262] 641-8653

The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

Service Department

Call toll-free 8am–5pm CST [800] 423-3183 or call [262] 641-8610
Emergencies after 5pm CST, call [847] 439-5655

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Our products are sold by a world-wide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

Contract Department

Call [262] 641-8610 Monday–Friday, 8am–5pm CST

Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

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